

WHAT IS CLAIMED IS:

1. A system comprising:
a virtual link bundle comprising a plurality of communication links, wherein
a first end of each of the communication links is configured to be coupled to a first network device;
a second end of each of a first one of the communication links is configured to be coupled to a first virtual network device sub-unit within a virtual network device; and
a second end of each of a second one of the communication links is configured to be coupled to a second virtual network device sub-unit within the virtual network device.
2. The system of claim 1, further comprising the first network device, wherein the first network device is configured to select a communication link of the plurality of communication links on which to send a particular packet.
3. The system of claim 2, wherein each packet sent between the virtual network device and the first network device is sent via only a one of the communication links.
4. The system of claim 2, wherein the first network device comprises a plurality of ports, each of the ports configured to communicate packets with a respective client,
the first network device is configured to append a header to a packet before sending the packet to the virtual network device via one of the communication links, the header identifies a one of the ports having received the packet.
5. The system of claim 1, further comprising the first virtual network device sub-unit, wherein
the first virtual network device sub-unit is configured to identify whether a one of the communication links is coupled to another virtual network device sub-unit within the virtual network device.

6. The system of claim 1, further comprising the first virtual network device sub-unit and the second virtual network device sub-unit, wherein
the first virtual network device sub-unit and the second virtual network device sub-unit are configured to communicate packets with each other via a virtual network device link.
7. The system of claim 1, wherein
the communication links are configured to be managed as a single link.
8. A system comprising:
a first virtual network device sub-unit comprising:
a first interface; and
a controller coupled to the first interface and configured to forward packets received via the first interface, wherein
the first interface is identified by a first logical identifier,
a second interface is identified by the first logical identifier,
an interface bundle comprises the first interface and the second interface, and
the second interface is comprised in a second virtual network device sub-unit.
9. The system of claim 8, further comprising the second virtual network device sub-unit.
10. The system of claim 9, wherein
the first virtual network device sub-unit is configured to maintain consistent forwarding information with the second virtual network device sub-unit.
11. The system of claim 10, wherein
the controller is configured to perform control protocol processing for the first interface according to a routing protocol running on the interface bundle,

the controller is configured to provide information generated when performing the control protocol processing to a secondary controller comprised in the second virtual network device sub-unit, and

the secondary controller is configured to use the information to manage the second interface.

12. The system of claim 8, wherein
the controller is configured to lookup a destination address of a packet in a lookup table, and
if the lookup table returns the first logical identifier, the first virtual network device sub-unit is configured to prioritize sending the packet via the first interface over sending the packet via the second interface.
13. The system of claim 12, wherein
if the lookup table returns the first logical identifier, the first virtual network device sub-unit is configured to send the packet via the first interface instead of sending the packet via the second interface, unless one or more of the first interface and a link coupled to the first interface are failed.
14. The system of claim 13, wherein
the first virtual network device sub-unit comprises a plurality of interfaces,
more than one of the interfaces are each comprised in the interface bundle, and
the more than one of the interfaces comprises the first interface.
15. The system of claim 14, wherein
if each respective communication link coupled to the more than one of the interfaces fails, the first virtual network device sub-unit is configured to forward the packet via the second interface comprised in the second virtual network device sub-unit.
16. The system of claim 8, wherein
the first virtual network device sub-unit is coupled to the second virtual network device sub-unit by a virtual network device link.

17. The system of claim 16, wherein
the first virtual network device sub-unit is configured to learn that a source address of
the second packet is behind the first interface, in response to receiving a
second packet via the virtual network device link.
18. The system of claim 16, wherein
the first interface is configured to filter the second packet from a packet flow being
sent via the first interface if the second packet was received via the virtual
network device link.
19. A system comprising:
a virtual link bundle;
a first virtual network device sub-unit; and
a second virtual network device sub-unit, wherein
a first interface of the first virtual network device sub-unit is coupled to the
virtual link bundle,
a second interface of the second virtual network device sub-unit is coupled to
the virtual link bundle, and
each of the first interface and the second interface is identified by a first
logical identifier.
20. The system of claim 19, further comprising:
a network device coupled to the first virtual network device sub-unit and the second
virtual network device sub-unit by the virtual link bundle.
21. The system of claim 20, wherein
the network device is configured to use a hash-based load-sharing algorithm to select
one of a plurality of communication links comprised in the virtual link bundle,
and
the network device is configured to send a packet via the selected one of the
communication links.

22. The system of claim 19, wherein
a primary controller comprised in the first virtual network device sub-unit is
configured to perform control protocol processing for the first interface
according to a routing protocol running on the virtual link bundle,
the primary controller is configured to send information generated by performing the
control protocol processing to a secondary controller comprised in the second
virtual network device sub-unit, and
the secondary controller is configured to use the information to manage the second
interface.
23. The system of claim 19, wherein
the first virtual network device sub-unit is configured to lookup a destination address
of a packet in a lookup table, and
if the lookup table returns the first logical identifier, the first virtual network device
sub-unit is configured to prioritize sending the packet via the first interface
over sending the packet via the second interface.
24. The system of claim 23, wherein
each of a plurality of interfaces comprised in the first virtual network device sub-unit
is coupled to a respective communication link comprised in the virtual link
bundle, and
the interfaces comprise the first interface.
25. The system of claim 24, wherein
if each respective communication link coupled to the interfaces fails, the first virtual
network device sub-unit is configured to send the packet via the second
interface comprised in the second virtual network device sub-unit.
26. The system of claim 23, wherein
the first virtual network device sub-unit is coupled to the second virtual network
device sub-unit by a virtual network device link.
27. The system of claim 26, wherein

- the first network device is configured to learn that a source address of a packet is behind the first interface, in response to receiving the packet via the virtual network device link.
28. The system of claim 26, wherein
the first interface is configured to filter a second packet from a packet flow being sent via the first interface if the second packet was received via the virtual network device link.
 29. A method comprising:
assigning a first logical identifier to each interface included within an interface bundle, wherein
the interface bundle comprises a first interface of a first virtual network device sub-unit and a second interface of second virtual network device sub-unit;
coupling a first end of a first link to the first interface, the first link comprised within a virtual link bundle; and
coupling a first end of second link to the second interface, the second link comprised within the virtual link bundle.
 30. The method of claim 29, further comprising:
coupling a second end of the first link to a third network device; and
coupling a second end of the second link to the third network device.
 31. The method of claim 30, further comprising:
selecting one of the first link and the second link on which to send a packet from the third network device.
 32. The method of claim 31, wherein the selecting is performed using a hash-based algorithm.
 33. The method of claim 31, wherein

each packet sent between the third network device and a virtual network device is sent via one, but not both, of the first link and the second link, and the virtual network device comprises the first virtual network device sub-unit and the second virtual network device sub-unit.

34. The method of claim 33, further comprising:
appending a header to a packet; and
sending the packet and the header from the third network device to the virtual network device via the virtual link bundle, wherein
the third network device comprises a plurality of ports, each of the ports configured to communicate packets with a respective client, and
the header identifies which one of the ports received the packet.
35. The method of claim 29, further comprising:
identifying whether any of the links comprised in the virtual link bundle are anchored to different virtual network device sub-units within the virtual network device.
36. The method of claim 35, wherein the identifying is performed by the first virtual network device sub-unit within the virtual network device.
37. The method of claim 29, further comprising:
communicating packets between the first virtual network device sub-unit and the second virtual network device sub-unit via a virtual network device link.
38. A method comprising:
sending a first packet via a first link of a virtual link bundle if a destination identifier associated with the first packet identifies the virtual link bundle; and
sending a second packet via a second link of the virtual link bundle if a destination identifier associated with the second packet identifies the virtual link bundle, wherein
the first link is coupled to a first virtual network device sub-unit, and
the second link is coupled to a second virtual network device sub-unit.

39. The method of claim 38, further comprising:
selecting the first link from a plurality of links comprised in the virtual link bundle,
wherein
the selecting comprises performing a hash-based algorithm.
40. The method of claim 39, further comprising:
appending a header to the first packet, wherein
the header identifies which port of a plurality of ports received the first packet,
and
the sending the first packet via the first link comprises sending the header via
the first link.
41. A method comprising:
receiving a packet, wherein
a destination identifier for the packet identifies an interface bundle, and
the interface bundle comprises a first interface; and
filtering the packet from a packet flow being sent via the first interface if the packet
was received via a virtual network device link.
42. The method of claim 41, further comprising:
sending the packet via the first interface if the packet was not received via the virtual
network device link.
43. The method of claim 42, further comprising:
maintaining consistency between a lookup table comprised in a first virtual network
device sub-unit and a second lookup table comprised in a second virtual
network device sub-unit.
44. The method of claim 42, further comprising
performing control protocol processing for the interface bundle at a primary controller
comprised in a first virtual network device sub-unit, wherein
the first interface is comprised in the first virtual network device sub-unit.

45. The method of claim 44, further comprising:
managing a second interface of the second virtual network device sub-unit in response to information generated by the performing the control protocol processing,
wherein
the second interface is comprised in the interface bundle.
46. The method of claim 45, further comprising:
looking up a destination address of a second packet in a lookup table, and
if the lookup table returns the destination identifier, sending the sending packet via the first interface of the first virtual network device sub-unit instead of sending the packet via the second interface of the second virtual network device sub-unit.
47. The method of claim 41, further comprising:
learning that a source address of the packet is behind a local interface, in response to receiving the packet via the virtual network device link.
48. A system comprising:
means for sending a first packet via a first link of a virtual link bundle if a destination identifier associated with the first packet identifies the virtual link bundle; and
means for sending a second packet via a second link of the virtual link bundle if a destination identifier associated with the second packet identifies the virtual link bundle, wherein
the first link is coupled to a first virtual network device sub-unit, and
the second link is coupled to a second virtual network device sub-unit.
49. The system of claim 48, further comprising:
means for selecting the first link from a plurality of links comprised in the virtual link bundle, wherein
the selecting comprises performing a hash-based algorithm.
50. The system of claim 49, further comprising:
means for appending a header to the first packet, wherein

the header identifies which port of a plurality of ports received the first packet,
and
the sending the first packet via the first link comprises sending the header via
the first link.

51. A system comprising:
means for receiving a packet, wherein
a destination identifier for the packet identifies an interface bundle, and
the interface bundle comprises a first interface; and
means for filtering the packet from a packet flow being sent via the first interface if
the packet was received via a virtual network device link.
52. The system of claim 51, further comprising:
means for sending the packet via the first interface if the packet was not received via
the virtual network device link.
53. The system of claim 52, further comprising:
means for maintaining consistency between a lookup table comprised in a first virtual
network device sub-unit and a second lookup table comprised in a second
virtual network device sub-unit.
54. The system of claim 52, further comprising
means for performing control protocol processing for the interface bundle at a primary
controller comprised in a first virtual network device sub-unit, wherein
the first interface is comprised in the first virtual network device sub-unit.
55. The system of claim 54, further comprising:
means for managing a second interface of the second virtual network device sub-unit
in response to information generated by the performing the control protocol
processing, wherein
the second interface is comprised in the interface bundle.
56. The system of claim 55, further comprising:

means for looking up a destination address of a second packet in a lookup table, and
means for sending the sending packet via the first interface of the first virtual network
device sub-unit instead of sending the packet via the second interface of the
second virtual network device sub-unit if the lookup table returns the
destination identifier.

57. The system of claim 51, further comprising:

means for learning that a source address of the packet is behind a local interface, in
response to receiving the packet via the virtual network device link.

58. A computer readable medium comprising program instructions executable to:
send a first packet via a first link of a virtual link bundle if a destination identifier
associated with the first packet identifies the virtual link bundle; and
send a second packet via a second link of the virtual link bundle if a destination
identifier associated with the second packet identifies the virtual link bundle,
wherein
the first link is coupled to a first virtual network device sub-unit, and
the second link is coupled to a second virtual network device sub-unit.

59. The computer readable medium of claim 58, wherein the program instructions are
further executable to:

select the first link from a plurality of links comprised in the virtual link bundle,
wherein
selecting the first link from the plurality of links comprises performing a hash-
based algorithm.

60. The computer readable medium of claim 59, wherein the program instructions are
further executable to:

append a header to the first packet, wherein
the header identifies which port of a plurality of ports received the first packet,
and
sending the first packet via the first link comprises sending the header via the
first link.

61. A computer readable medium comprising program instructions executable to:
detect reception of a packet, wherein
a destination identifier for the packet identifies an interface bundle, and
the interface bundle comprises a first interface; and
filter the packet from a packet flow being sent via the first interface if the packet was
received via a virtual network device link.
62. The computer readable medium of claim 61, wherein the program instructions are
further executable to:
send the packet via the first interface if the packet was not received via the virtual
network device link.
63. The computer readable medium of claim 62, wherein the program instructions are
further executable to:
maintain consistency between a lookup table comprised in a first virtual network
device sub-unit and a second lookup table comprised in a second virtual
network device sub-unit.
64. The computer readable medium of claim 62, wherein the program instructions are
further executable to:
perform control protocol processing for the interface bundle at a primary controller
comprised in a first virtual network device sub-unit, wherein
the first interface is comprised in the first virtual network device sub-unit.
65. The computer readable medium of claim 64, wherein the program instructions are
further executable to:
manage a second interface of the second virtual network device sub-unit in response
to information generated by performing the control protocol processing,
wherein
the second interface is comprised in the interface bundle.

66. The computer readable medium of claim 65, wherein the program instructions are further executable to:

look up a destination address of a second packet in a lookup table, and
if the lookup table returns the destination identifier, send the sending packet via the first interface of the first virtual network device sub-unit instead of sending the packet via the second interface of the second virtual network device sub-unit.

67. The computer readable medium of claim 61, wherein the program instructions are further executable to:

learn that a source address of the packet is behind a local interface, in response to detecting reception of the packet via the virtual network device link.